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A Study of the Conditions Frequently Called "Sciatic Scoliosis."

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REPRINTED FROM THE AMERICAN JOURNAL OF ORTHOPEDIC SURGERY.
MAY, 1913.

PRINTED FOR THE AUTHOR.

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A STUDY OF THE CONDITION FREQUENTLY CALLED "SCIATIC SCLIOSIS."

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Medical science of the present age frequently represents an international relationship. The leading important questions in theory and practice are discussed at medical assemblies and in journals before a forum of the civilized world. There are however questions of perhaps subordinate character but sufficient importance which are discussed by the authors of different nations in different lights. This is the impression we have had in studying the literature of sciatica and more particularly of the deviations of the body which are at times seen in cases suffering from conditions thought to be sciatica. In the European literature the "sciatic scoliosis" (or "scoliotical sciatica" as this deviation frequently has been called), has found a great number of authors who have discussed, frequently with much enthusiasm and even excitement, that affection as a symptom of sciatica in a wider sense of the word, *i.e.*, a primary affection of nerves belonging to the sacral and lumbar plexus. In the American literature we find a striking contrast in that the lateral deviation, as far as the writer knows, has never been made subject to a special study in connection with sciatica or lumbago. On the other hand, American and also French authors have frequently called attention to such lateral deviations as a symptom of certain affections of the pelvic articulations and the lower lumbar spine.

The writer has been very much interested by this peculiar fact and has begun investigations of the rich material of the Orthopedic Clinic of the Massachusetts General Hospital with the

idea of bringing these different points of view into some sort of harmony. These investigations are still in the course of progress and no definite conclusions have been arrived at as yet.

The present paper shall be devoted to a review of the literature which deals with the lateral deviation in connection with pain in back and legs. It also shall bring statistical data taken from a part of our material and shall finally report a few cases treated with methods which, though not original, have, as I believe, not always found sufficient attention.

In the following we shall use the term *sciatica* because of its simplicity, independent of the question as to whether it is of primary or secondary origin.

In the American literature many text-books on diseases of the nervous system, as *Buzzard, Lloyd, Gowers, Wilks, Turner, Gray, Stewart*, and others do not mention lateral deviation or other attitudinal peculiarities as symptoms of *sciatica*, while others as *Dana, Dercunn, Starr, Bailey, Osler*, and others admit that lateral deviation may take place in the course of the disease without however going much into the details.

Among numerous articles on *sciatica* in English and American journals the writer has found none which deals with *sciatic scoliosis* or contains any noteworthy remarks as to the attitude.

In the European literature not only many articles on *sciatica* and text-books in the corresponding chapters describe *sciatic scoliosis* more or less substantially, but there are more than fifty articles which have been particularly devoted to the explanation of that affection. Since *Gussenbauer* in 1878* has published his case under the name of "*Ischias paradoxa*" or "*Scoliosis neuromuscularis*" the discussion has not yet come to an end. The great number of different theories which have been made to explain the pathogenesis and mechanical conditions of *sciatic scoliosis* give the impression that none of them has been fully sufficient.

It is not our plan to follow the development of the various theories in a historical line. In regard to this we refer to the

* A few observations of an earlier time by *Valentini, Vancetti, Massalongo*, etc., did not attract general attention.

papers of *Ehret*, *Fopp*, *Hoffa*, *Oberndoerffer*, *Stein*, and others. From a practical point of view we shall follow *Erben's* example and classify the most important views under certain heads. A special discussion of the different types shall be omitted in the present paper to avoid too much complication of the main question.*

THEORIES.

I. Sciatic scoliosis results from the effort of the patient to remove weight bearing from the affected leg (*Albert*, *Charcot-Babinsky*). The center of gravity is transferred toward the sound side. The reason for this phenomenon is in *Albert's* opinion the affection of joint nerves. *Charcot* and his pupil *Babinsky* suppose that by the contraction of the pelvic muscles in weight bearing an irritation of the affected nerves is caused which is prevented by removing the weight over to the sound side. The deviation is caused by contractions of the muscles of the sound side. In persistent cases fibrous retractions take place and prevent the cure of the deformity, even when the affection of the nerve has been healed. While *Erben* admits that the relief of weight bearing is of importance in many cases, he points out that frequently this explanation cannot be correct, because there are cases in which the center of gravity is in the middle-line or even transferred to the affected side, and other cases, where the deviation is not relieved by suspension or in the lying position.

Ehret has tested the weight bearing by putting the patient with either leg on a weight scale and noticed that both legs bear usually the same weight. In several cases more weight was borne even on the affected side and those cases were mostly very grave ones.

The irritation of the affected nerves by the contraction of muscles and the relief of this irritation by the lateral deviation

* The first type described was the most commonly seen so-called "heterologous" type or *scoliose croissée* (*Brissaud*), where the trunk deviates to the side opposite from the affected side. The others are the "homologous" type, where the trunk deviates to the affected side, and the "alternating" type, where deviation to either side may take place, an alternation which in some cases is subject to the will power, in others not.

plays a prominent rôle in several publications. For instance, *Guse, Ehret and Lesser* consider the contraction of the pyriformis muscle an important factor in causing irritation of the sciatic nerve which is relieved by the lateral deviation.

In connection with this idea it is interesting to remember the theory of *Barchinger* who ascribes the pyriformis muscle an important rôle in causing sciatica.

On the base of anatomical studies *Schuedel* believes that the pyriformis muscle in the state of contraction does not compress, but, just in the contrary, overbridges and protects the sciatic nerve.

II. A widely accepted theory is based on the idea that the lumbar muscles especially the sacrolumbalis of the sound side pull the trunk over to that side, when the corresponding muscles are not at all or not sufficiently functioning.

Kocher and his pupil *Schuedel* believe that the erector spinæ of the affected side fails to contract, because of the affection of its own sensory nerves, a condition which *Schuedel* has called "neuralgic insufficiency." *Fischer and Schoenwald* as well as *Sachs* believe that by the avoidance of function on the part of the erector spinæ those affected lumbar nerves are protected which perforate that muscle respectively are near to it.

Gussenbauer, Mann, Mazurke and others go even one step further and explain the lack of function of the erector spinæ by a real paresis or paralysis which according to *Gussenbauer* is due to a strain or partial tear of that muscle.

Mann has described as the first the frequent occurrence of atrophy of the hamstrings, calf and gluteal muscles in cases of sciatica of long duration and has concluded that in the same way the erector spinæ has become atrophied and unable to hold the body symmetrically. *Bregmann* expresses a similar opinion.

Erben has emphasized that these opinions are based on a wrong idea of the function of the back muscles and furthermore on incorrect clinical observations. In fact the erector spinæ of the affected side always shows a very marked contraction and no sign of paresis.

III. Another theory is that of *Nicoladoni* who believes that scoliosis takes place in a case of sciatica, when the affection of the nerve goes up into the spinal canal to the cauda equina. He supposes that the neuralgic affection is associated with a swelling of the nerve and the surrounding tissues and that by the lateral deviation the space within the spinal canal and within the foramina intervertebralia is widened on the convex or affected side.

Mazurke also supposes an intervertebral affection in connection with sciatica to be the cause of a certain type of the scoliosis. Of the same opinion is *Thomayer* who ascribes the persistence of the scoliosis, after the sciatic pain has stopped, to the lasting affection of the posterior nerve roots.

Nicoladoni's view was refuted by Schuedel who did not believe that the lateral deviation has the said effect in regard to the widening of the intervertebral foramina, while Erben agrees with Nicoladoni in this respect, but does not believe that the neuralgic affection goes as high up as to reach the cauda equina.

Kypke-Burchardi explains the fact, that in some cases of sciatica scoliosis takes place, in others not, by the direction in which the affection of the nerves progresses from the seat of the primary lesion. In the scoliotic cases he supposes that this progress has a central direction, in the others a peripheral direction.

Many other authors ascribe to the affection of the lumbar nerves a great rôle in causing the sciatic scoliosis while *Remak*, *Valentini*, *Guse* and others report cases which do not show signs of an affection of the lumbar nerves. Erben has seen cases with and without such signs.

Schuedel by careful anatomical dissections found an anastomosis from the second and first sacral cord upward to the lumbar plexus. This nerve runs on the inside of the posterior iliac spine and tenderness on pressure at this point is in his opinion due to the affection of this nerve. A lateral deviation, he says, takes place, when the painful affection of the sciatic nerve has passed over to the lumbar plexus by means of this

anastomosis. Lately *Stein* has accepted this theory in explaining a typical case of alternating scoliosis.

IV. *Baehr, Ehret, Guse, Lesser* and others explain the deviation in a lateral as well as in an anteroposterior sense as due to the inclination of the pelvis. *Ehret* has made most exact and interesting studies to support this theory, and he explains with it the various types of sciatic scoliosis. The inclination of the pelvis is due to the effort of the patient to relieve the nerve from pressure. He has made careful anatomical research to determine the direction of the sciatic and femoral nerves. He found out, that both these nerves have the straightest direction, when the thigh is held in a slight flexion, abduction and outward rotation, a position which so frequently is seen in cases of sciatica and particularly in cases of sciatic scoliosis. As it was mentioned before, *Ehret* is one of those authors who have found the lateral deviation as a very frequent occurrence in cases of sciatica. He especially emphasizes the fact, that he has seen a number of acute cases of sciatica within the first days of the disease, who showed that position of the affected leg even in bed. All those cases showed also a distinct lateral deviation both in lying and in standing.

V. The deviation of the spine is caused by muscular spasm. *Brissaud, v. Bonsdorff, Salomonson* and others. It depends on the preponderance of spasm in the lumbar muscles of the affected or the sound side whether the homologous or the heterologous type is caused. *Hoffa and Krecke* believe that the deviation is caused by reflex contracture. Also *Vulpinus* considers reflex spasm to be the cause of deformity.

Thoele considers sciatic scoliosis caused by a complicated reflex due to a tension of the painful and inflamed nerves.

Sachs and Plate ascribe the iliopsoas muscle a prominent rôle in the mechanism of the sciatic scoliosis. *Lorenz* speaks of a spastic relief of tension (spastische Entspannungshaltung).

VI. *Bruehl and Soupault* suppose that the scoliosis is caused by the effort of the patient to protect the affected leg from movement.

VII. *Staffel*, an assistant of *Schanz*, considers the insuffi-

ciency or weakness of the spine (*insufficiencia vertebræ*) to be the cause of sciatic scoliosis. Schanz has proposed this term for certain types of the weak relaxed back, just as he speaks of the weak and strained foot as "*insufficiencia pedis*."

VIII. *Baehr* states in one of his papers that the lateral deviation may be due to an arthritic affection of the spine, at least in aged people.

IX. *Pal* emphasizes that sciatic scoliosis may be caused by pronated flat feet; he has cured four cases by strapping the feet with adhesive plaster and adjusting foot plates. In regard to the mechanical explanation he agrees with Albert and Charcot.

X. Hysteria is considered by *Binswanger* to be the cause of a persistent scoliosis in a case of traumatic sciatica.

Corresponding to the great number of theories, we find a remarkable variety of names given by various authors. The most frequently used names are scoliosis ischiadica and ischias scoliotica. Others are sciatique déformante (*Berbez*), sciatique spasmodique (*Brissaud Lamy*), scoliosis neuropathica or neuro-paralytica (*Vulpus*), scoliosis neuralgica or neuritica, scoliosis lumbagica (*Hovorka*), scoliosis neuromuscularis (*Fopp, Gussenbauer*), scoliosis lumbalis neuromuscularis ev. with the addition ischiadica (*Stein*), ischias paradoxa (*Gussenbauer*), sciatique ancienne (*Rouget*), etc.

We shall now turn our attention to those authors who describe the so-called "sciatic scoliosis" as a symptom of a condition in which sciatica plays merely a secondary rôle. *Denucé* in 1899 has written a paper on "la scoliose dite sciatique" and comes to the following conclusions: "Sciatic scoliosis does not exist at all; genuine, idiopathic sciatica and all other painful affections of the leg induce the patient to remove the weight bearing from the affected leg by a deviation of the body toward the sound side. But these deviations are not permanent and are not scolioses. The coexistence of more or less fixed deviations of the lumbar spine with lateral inclination of the pelvis and with sciatica suggest a symptomatic sciatica, the primary cause of which is in most cases a 'sacrocoxalgie.'" To

support his theory Denucé quotes a number of authors who consider affections of the sacroiliac region as frequent cause of sciatic pain. Some of them mention directly deviations of the trunk and pelvis as symptoms of a "sacrocoxalgie." "La position hanchée" which *Hattute*, as early as 1852, has called a sign of "sacrocoxalgie" is nothing else than a lateral deviation of the lumbar spine with marked prominence of the affected hip.

Délens points out that "sacrocoxalgie" has frequently been considered as sciatica; that the patient avoids standing on the affected leg and that the attitude in standing resembles that frequently seen in "coxalgia" (hip disease). *Delbet* reports two cases of "sacrocoxalgie" the most prominent symptom of which is sciatic pain. He emphasizes the danger of making a diagnosis "sciatica" in such cases where pain of the sciatic nerve is caused by osteoarthritis of the sacroiliac articulations.

The French term "sacrocoxalgie" is apparently identical with the English term sacroiliac disease, which was first proposed by *Erichson* in 1859. In the five cases which he reports *Erichson* considers the affection of the sacroiliac joints to be of a tuberculous nature. He makes some remarks as to a deformity, without giving a clinical picture, identical with sciatic scoliosis. As important symptom of sacroiliac disease he describes an "alternation in shape of the hip and length of the limbs; the anterior superior spine of the ilium is not only on a lower level, but also more prominent on the diseased side."

A more conclusive picture is presented by *Sayre* in his "Lectures on Orthopedic Surgery." He states: "In sacroiliac disease there is no abduction or eversion of the limb as in hip disease, but simply a longation. On the contrary the distortion present in sacroiliac disease is a distortion of the body. The patient bends the body over to the opposite side, so that the weight of the limb makes extension sufficient to give relief to the diseased articulation. This bending over to one side for the purpose of removing pressure from the diseased structures by bringing the weight of the limb to bear upon the ilium, produces a deformity that is particular and characteristic of sacroiliac disease."

Sayre brings a typical illustration of a sciatic scoliosis. He does not give the history of that patient, thus leaving it uncertain whether the patient has had a real tuberculosis of the sacroiliac joint or not. But so far we understand Sayre, he did consider this patient's affection a tuberculosis.

Heath in 1876 describes a case of sacroiliac disease where at first the diagnosis sciatica was made. The patient showed a slight swelling over the left sacroiliac joint and could not stand well on the left leg which seemed to be weaker than the right one. A slight curvature of the left side of the spine was noticed, but no other irregularity of the spine. An abscess had formed over the swollen area and was aspirated.

In one of the most thorough articles on sacroiliac tuberculosis of more recent years (1906) *Zesas* states: "In younger individuals by the permanent abnormal posture a displacement (*Verschiebung*) of the spine, the so-called 'scolioses attitudes' may take place." It may be added that *Zesas* calls attention to the differential diagnosis of sacroiliac tuberculosis with sciatica and lumbago.

In numerous publications of sacroiliac tuberculosis, where the diagnosis has been confirmed by autopsy, operation or puncture, the writer has not found remarks as to the attitude. Frequently a note is made that standing or walking was entirely impossible, when the patient came to examination. This is not at all surprising, when we consider the grave destruction which tuberculosis so often causes.

While it is possible that tuberculosis of the sacroiliac joints at times, in adults, and when the affection has a slow, insidious character, may produce a clinical picture similar to sciatic scoliosis, we do not think that tuberculosis plays a prominent rôle in the etiology of this deformity.

The terms sacroiliac disease respectively sacrocoxalgie have certainly been used and are still used in a wider sense than pointing to tuberculosis, but it was not until 1905, when *Goldthwait* and *Osgood*, on the base of careful anatomical studies and clinical observations, demonstrated that the sacroiliac articulations,

being true joints,* are subjected to all other lesions with which the joints of the body may be afflicted, and that their peculiar anatomical conditions may lead to affections which are typical for them.

Furthermore, in the quoted article and more particularly in later publications by Goldthwait, special reference was made to sciatica and lumbago as frequent symptoms of various types of sacroiliac affections.

Since Goldthwait's and Osgood's first paper many similar observations have been published by American writers confirming Goldthwait's findings, while the German and English literature has not brought any notable contribution to the discussion of sacroiliac affections except those caused by tuberculosis or severe traumatism.

It is not the subject of this paper to discuss Goldthwait's and Osgood's theories in detail, but only as far as deviations of the trunk are concerned.

In their first article "A consideration of the pelvic articulations from an anatomical, pathological and clinical standpoint," Goldthwait and Osgood describe the lateral deviation of the body. "On standing, if the sacrum is at all displaced, the lumbar curve of the spine may be obliterated or even reversed; the whole attitude being suggestively peculiar. If one side is more involved than the other, a marked lateral deviation of the body may be present, this always being away from the affected joint. A slight degree of this lateral deviation is very common."

In the article on the "Pelvic articulations" (1907) *Goldthwait* states: "Disease or weakness of the sacroiliac joint frequently results in peculiarities in the use of the body that are suggestive. When standing the body is usually inclined away from the joint chiefly affected."

In the book of *Goldthwait, Painter and Osgood* on "Diseases of the Bones and Joints" (1909) in the chapter on the pelvic articulations the lateral deviation is referred to in a more detailed way. After dealing with the displacement of the sacroiliac

* *Albee* has lately confirmed this fact by dissecting the sacroiliac articulations on fifty cadavers; all showed true sacroiliac joints.

joint, it is said: "It is in these cases of injury or of disease upon one side that lateral deviations of the trunk are seen. It is also in these one-sided lesions that referred pains are met most frequently." The report of the cases shows several examples of different degrees of listing of the body. Treatment applied with the tendency to restore proper mechanical conditions at the sacroiliac joints resulted in complete cure in all cases. In one case an arthrodesis of the sacroiliac joint was performed with complete success, after a previous manipulation with following recurrence.*

Hatch confirms Goldthwait's observations on sacroiliac disease and states that in such cases "the lumbar curve is either obliterated or there may even be a curve in the other direction." "Sometimes we see lateral deviation of the body."

Dunlop briefly mentions the list of the body as symptom of relaxation of the sacroiliac synchondroses.

In another paper on the relaxation of the sacroiliac synchondroses the same author states: "One of the most prominent features is the lateral deviation of the spine from the sacrum with a corresponding prominent hip. This is undoubtedly due to the attempt of nature toward fixation of the joint, often by an intense spasm of the lumbar (erector spinæ) muscles of that side; this cannot only be felt, but seen by the prominence of the muscles, especially in walking or attempted motion of the spine. The normal contour in the region of the sacrum is fairly constant. The entire region of the sacrum may be much more prominent with the lumbar curve obliterated, or just opposite with a marked lordosis." "A lateral deviation beginning just at the lumbo-sacral junction, with, in many instances, a compensatory curve in the dorsal region, is probably the most constant change. These changes in contour of the spine are probably wholly due to muscle spasm as they are correctable at the time of examination and become less prominent after treatment." In all three of the recorded cases a deviation or curve of the spine is noted.

Scott describes sacroiliac strain as a condition which is fre-

* Painter has given a complete description of this case and the technic of operation.

quent among the miners of Alabama and is called there "the coal digger's back." He pictures a patient with a typical list of the body toward the right side and backward. The spine shows a right convex total scoliosis, and flattening of the lumbar lordosis. The left ilium is somewhat elevated and the left leg atrophic.

Andrews and Hoke describe the attitude in sacroiliac disease: "In standing, the lumbar curve is obliterated if the sacrum is displaced backward and *vice versa*. The whole body is frequently thrown forward, the body is usually inclined away from the diseased joint."

Ogilvy, in a study on chronic backache, classifies four types of cases: a. postural back, b. rotary lateral curvature, c. sacroiliac strain, d. flat feet. In sacroiliac strain, besides other symptoms, there is seen a unilateral curvature of the spine toward the side affected.

Peckham in his paper on "Physiotherapy in sacroiliac conditions" refers to the relaxed sacroiliac joints in saying: "More commonly one side only is troublesome and if the joint has been at all tender and there has been much pain either at the joint or down the leg the body may be deviated from this side. This is probably due to the patient's, unconsciously at first, standing over on the good foot and leg and trying to keep off the affected side."

Taylor in his "Orthopedic Surgery for Practitioners" says in the chapter on sacroiliac strain: "The weight in standing is borne on the well leg, and lameness is often present. There is frequently a marked curvature of the spine, with the convexity toward the well side." An illustration shows a man with a marked deviation of the body to the right side, a left lumbar and right dorsal curvature; it is presented as "strain of left sacroiliac joint with deviation of trunk to right from a sneeze six weeks before."

Nutter describes a patient who walked with a marked right limp, and inclined his body toward the same side. He complained of pain in the right buttock and sacrum. The author considers his case as one of "simple undue motion of the right

sacroiliac joint, a mobility which was sufficient to irritate certain of the nerve roots." He also points out expressively: "The patient's sacrum was evidently not displaced, as his back was not especially flat."

Morill, in an article on sacroiliac strain, states that in the majority of cases only one side is affected and describes the deformity with the following remarks: "In forward bending, the patient will slightly lean toward the opposite side, and lateral bending is also restricted in the lower portion of the spine in leaning toward the well side, while toward the injured side it is inclined in the general curve. This is caused by the spasm of the erector spinæ muscles on the affected side."

"Often in severe cases the greater part of the body weight is thrown on the sound side and one may find a marked curve in the lower spine, with perhaps a compensatory one higher up, caused by the tilting of the pelvis laterally to relieve the injured joint. In these cases the hip on the affected side is the more prominent, and the leg seems longer, the patient standing with his knee bent."

Young in an article on "sacroiliac displacement," says: "In those patients who periodically have the displacement reduced there is frequently associated curvature or some other condition." He cites "a case with a lateral curvature of the spine which he was able to correct by complete reduction and proper bandaging."

Fitch in his article on the "mechanical lesions of the sacroiliac joints" states: "On physical examination a person suffering from a strain of moderate severity of one or both sacroiliac joints will be seen to stand in a stooping position with the body listed to one side, usually, but not always, away from the side which is the more affected. The knee will be slightly flexed. The normal curve of the lumbar spine must be restored whenever it has been altered."

In one of the most extensive and thorough papers on sacroiliac relaxation by "*Meisenbach*" attention is called to the deviation of the body. Meisenbach divides his cases into four main groups: a. The traumatic type with two divisions: I.

Direct trauma to the normal sacroiliac joint and II. following polyarthritis. b. Relaxation due to the general debility; c. secondary to uterine; d. neurotic. In tracing the common objective symptoms he states: "Walking is interfered with, motion of the spine may be limited, or the patient may be bent forward unable to assume a straight posture. The characteristic symptom in the acute traumatic condition is the tilting of the pelvis and listing of the patient to one side, usually toward the side of injury." In the second group, relaxation due to general debility, we find the remark: "These cases usually present bilateral lesions of the sacroiliac joint. The symptoms are a constant or general weakness in walking, and a tired feeling while standing. They usually present a flat back, which indicates that the process has been going on for some time with exacerbations at intervals." In the fourth group "neurotic," Meisenbach refers to "that class of individuals with high-strung nervous temperaments and active life, whose musculature does not easily relax except while they are asleep. This intermittent relaxation may at times cause strain of the sacroiliac joint. "In these cases, we find a slightly tilted pelvis with a relatively shortened limb. 'Flat back' is less frequently seen, but the opposite, a lordosis with forward tilt of the pelvis caused by the tensivity of the hamstring muscles as well as the psoas and pyriformis groups."

In all five cases illustrating the traumatic type deviations of spine or pelvis or both are noted. A photograph shows the typical pictures of a "sciatic scoliosis": It is presented as "traumatic acute unilateral sacroiliac dislocation." In one of four cases illustrating the type b, a slight lateral curvature of the spine is mentioned, together with an increase of the physiological anteroposterior curves. In two others an increase and in one a decrease of the lumbar lordosis is noted. In one of them a typical list or tilt is mentioned. One case in group c is reported to have had an increase of the lumbar lordosis in standing and even more in lying, without lateral deviation; also in two cases of group d only an increase respectively a decrease of the lumbar lordosis is reported.

In reviewing these different statements we may classify them as follows:

I. A lateral deviation suggests a unilateral displaced sacrum (Goldthwait and Osgood, Meisenbach); a relaxation (Dunlop) or an undue motion of one sacroiliac joint (Nutter), a sacroiliac strain (Scott, Taylor, Morill), a disease or weakness of one sacroiliac joint (Goldthwait, Andrew and Hoke).

II. The deviation is usually directed toward the sound side; only Meisenbach states the opposite as the more frequent occurrence.

III. A unilateral curvature toward the affected side is seen in sacroiliac strain (Ogilvy); a lumbar curve with often compensatory dorsal curve is seen in sacroiliac strain (Morill). Curvature is frequently associated with patients who periodically have the displacement reduced (Young).

IV. Obliteration of the lumbar lordosis suggests a displaced sacrum (Goldthwait, Nutter); or a relaxation due to general weakness (Meisenbach, type B).

V. Increase or decrease of the lumbar lordosis may be caused by relaxation of the sacrum (Dunlop). Tilting of the pelvis is seen in acute traumatic conditions (Meisenbach, type a). Increased lordosis is seen in relaxed cases (Meisenbach, type d).

Notes as to the mechanical explanation of the deviation are made as follows:

Morill states: The weight of the body is thrown on the sound side. Dunlop considers the lateral deviation as an attempt of fixation, by intense spasm of the muscles (erector spinæ). According to Meisenbach the tension of the hamstrings, psoas and the muscles of the pyriformis groups play a rôle in the increased lumbar lordosis.

In the following remarks several authors are reviewed who ascribe certain cases of the typical deviation, called "sciatic scoliosis," to arthritic conditions of the spine or the sacroiliac joints or to affections others than sacroiliac relaxation or strain.

Whitman in his "Treatise on Orthopedic Surgery" describes the sciatic scoliosis as a frequent symptom of chronic sciatica.

but adds: "It must be borne in mind that disease of the lumbar spine, particularly at the lumbosacral articulation, or injury or disease at the sacroiliac junction, may induce similar distortion of the spine accompanied by pain in the limbs. Also that disease of the pelvic bones or the adjacent organs or parts, may set up sciatica; thus the cause of pain should be carefully sought." The legend under an illustration of a typical case is as follows: "Deformity caused by persistent sciatica of the right side. This attitude is similar to that symptomatic of sacroiliac disease."

In the text-book of orthopedic surgery in the chapter on lateral curvature *Bradford and Lovett* mention "ischias scoliotica" with its different names and types. Further down it is said: "Alteration in the shape of the vertebræ from disease may cause lateral curvature. It may also occur in Pott's disease and sacroiliac disease as the result of muscular spasm." In the chapter on sacroiliac disease: "The position of the body in walking or standing is fairly characteristic, the weight of the trunk being thrown upon the well foot, while the other leg hangs down; this exerts a slight extension by its weight."

In the cited book of Goldthwait, Painter, and Osgood in the chapter on hypertrophic arthritis of the spine an illustration of a man is given who shows the typical clinical picture of sciatic scoliosis. "There is often times in these cases a very considerable degree of deformity present consisting of lateral deviations of the column as a whole without any sharp angular Kyphosis." The connection between hypertrophic changes of the spine and the sacroiliac joints is also mentioned.

Freiberg in his article on "Sciatic Pain as an Orthopedic Symptom" (1909) illustrates a case with the typical list of the body to the left side. He has seen the case at a time when the X-ray examination was not as well developed as it is now, but firmly believes that this patient belongs "in the category of hypertrophic disease of the spine and the sacroiliac joint."

Another patient of *Freiberg's* who had been suffering for seven or eight years from sciatica on the left side showed "a peculiar posture, a deviation of the trunk toward the right side,"

the X-ray examination of this case detected a "hypertrophic disease of the lumbar spine and the left sacroiliac joint."

Interesting in this connection are the findings in cases of dislocation of the lumbar spine.

Riedinger describes a case with a rotatory dislocation of the fourth over the fifth lumbar vertebra on the right side. Eighteen months after the injury, when first seen by the author, the patient showed a slight left dorsal scoliosis; the pelvis is somewhat higher and more prominent on the left side, suggesting a a list of the body toward the right (affected) side. This case is especially interesting in regard to the selfreduction which took place, when the patient made an exercise on a Zander appaius. In *Feiss's* case of a partial displacement of the fifth lumbar vertebra over the sacrum on the left side "the spinous processes showed a large left dorsal and slight right lumbar curve."

Finally, the interesting case described by *Goldthwait* in 1911 may be mentioned. Goldthwait, in a paper on "the lumbo-sacral articulation" has opened interesting prospects for the possible explanation of cases of lumbago and sciatica as caused by certain lesions of that articulation. He also has shown the particular rôle which this part of the body plays in regard to the frequent occurrence of anatomical variations. In the description of the case it is said concerning the attitude: "The body was drawn forward and to the left." "There was extreme tenderness in the sacral region with pain extending into the legs, the right being much worse than the left."

Conclusion.—The great variety of explanations of sciatic scoliosis suggests that we have to deal with a complex problem. Although sciatic scoliosis represents, in its severe form, a well-defined clinical picture, we are of the opinion that it is not an anatomical entity. Both the sciatica as well as the scoliosis, whenever the term scoliosis is allowed, are symptoms, and neither one of them can be considered as a disease *sui generis*. With further progress in our knowledge of the sacroiliac and lumbosacral region, from an anatomical and mechanical point of view, more light will be thrown upon those affections of which sciatic scoliosis is one of the most severe and most characteristic symptoms.

For the practical purpose of the therapy we hope that increasing knowledge of the pathogenesis may not only give us more exact indications for the treatment, but also may explain the undoubted success obtained by various authors with so widely different methods.

STATISTICS.

The writer has looked over the Out-patient Records of all cases recorded as sacroiliac strain, relaxation, displacement, or disease in the years 1906-1911 inclusive.* The total number is 761 cases. Among them 174 cases have been recorded as being listed or showing lateral deviations. Changes of the antero-posterior curves or tilting of the pelvis in anteroposterior direction have not been considered in these statistics. Those out-patient records, being taken by many different physicians and often under the strain of a very busy clinic, are probably not always complete and correct and the number 174 or 22.7 per cent. is presumably too small. The distribution as to sexes is 139 male and 33 female of the deviated cases, while the not deviated cases show a distribution of 353 male and 205 female.

In regard to the age the following data are made out:

Age	Listed	Per cent.	Unlisted	Per cent.
Below 20 years.....	5	2.9 per cent.	35	5.1 per cent.
21-30 years.....	49	23.6 per cent.	159	27.1 per cent.
31-40 years.....	63	36.2 per cent.	196	33.4 per cent.
41-50 years.....	46	26.4 per cent.	135	22.9 per cent.
51-60 years.....	10	5.7 per cent.	47	8.0 per cent.
61-70 years.....	1	0.7 per cent.	14	2.4 per cent.
71 and more years	0		1	
	174		587	

* The etiological conception of sciatica and lumbago in our clinic, before and after the first publication of Goldthwait and Osgood, is clearly expressed by the following data: Among the first 60,000 out-patient records up to 1905 there are recorded 200 cases of lumbago and 95 cases of sciatica, while in the last 130,000 records up to the year 1911 the corresponding numbers are 76 and 86. During the same period from 1906-1911 we find 761 cases of sacroiliac disturbances and 741 cases of lumbar back strain. This relation would be still more striking if the diagnosis would have been recorded in all cases.

Among the cases below twenty years there is none below the age of puberty; by far the most are in the years from twenty to fifty and particularly in the years from thirty-one to forty, these being the years of most active life, where the dangers of trauma, strain, exposure to cold, etc., are greatest.

As to the side of the list and the relation of list and pain the following data have been gained. Eighty cases show a list to the right side and seventy-one to the left; in twenty-three cases no notes were found as to the side. In sixty-seven cases the pain and list were on different sides, in thirty cases on the same side.

Left pain and right list.....	37
Right pain and left list.....	30
Right pain and right list.....	17
Left pain and left list.....	13

Other points are not recorded with sufficient exactness and shall be considered below on the base of our own observations.

As to the frequency of the lateral deviation the authors do not entirely agree. The greater number of observers of sciatic scoliosis consider that affection a rather rare one and several emphasize that the number of published cases is very small in relation to the very large number of cases of sciatica and lumbago. Stein has asked one hundred physicians in Wiesbaden about their experience with cases of sciatic scoliosis. "It is interesting to state that the number of reported cases of scoliosis is only twenty among several thousand cases of sciatica" and Stein emphasizes the fact that there are usually the more severe cases of sciatica who go to Wiesbaden for relief. One of the most busy physicians who answered Stein's question reported five cases of typical scoliosis among 800 cases of sciatica. These numbers are in agreement with Stein's own experiences.

Ehret holds just the opposite point of view. He has observed a large number of acute and chronic cases of sciatica and is of the opinion that sciatic scoliosis is of frequent occurrence. He says "One always observes a characteristic position even in

bed. Since the abnormal position of the leg in cases of sciatica is in our experience never entirely absent, a deviation of the spine must be present in every case of sciatica."

Phulpin says: "La scoliosè est un phènomène a peu pres constant dans la sciatique."

We have found in our material 22.7 per cent. of listed cases, a percentage which is certainly far too low. The writer is not able to say how many of those patients show a deformity which is identical with that called "sciatic scoliosis," but the percentage in our records is certainly far greater than in the statistics of that mentioned Wiesbaden physician. We do not consider cases with a marked persistent deviation as rare at least in our material.

The proportion 30 : 67 of the homologous cases to the heterologous cases is in agreement with several authors (Fopp, Oberndoerffer). In practice however this proportion seems to be too high in favor of the homologous type, at least in the writer's experience, who has found the homologous deviation only four times among forty cases.

In the following certain points of interest are discussed, based upon examination of forty cases which have been observed by the writer himself since the plan to this paper was made.

1. Among those forty cases there are only nine women and only one of them presents a marked lateral deviation. This is in agreement with most papers, but I have nowhere found it mentioned as a point of special importance. It must make us somewhat sceptical as to the importance of sacroiliac relaxation as a cause of sciatic scoliosis. Most of our male patients are strong, healthy men, who have done hard work during their life. A priori we should not expect such patients to have particularly weak or relaxed sacroiliac joints. Furthermore the clinical examinations in most cases did not show any signs of a relaxed sacroiliac joint, but, on the contrary, many cases showed a considerable limitation of motion of that joint on the affected side.

2. Among the thirty-one male cases the cause has been a single trauma in twelve cases: Heavy lifting in six cases, a certain

catch in chopping wood or shovelling coal in two cases, falling on the hip or on the buttocks in three cases, a sudden catch after a heavy day's work in one case. In the remaining nineteen cases the onset has been gradual and the cause was probably a frequent occupational strain of the sacroiliac or lower lumbar region. Frequent heavy lifting, heavy carrying (paddler), working on a sewing machine (tailor), occupation as motorman or conductor on a street car (three cases), frequent bending forward (shoe-cleaner), frequent athletic strain in rowing, etc. In a few cases exposure to frequent change in extreme temperatures was mentioned as a further cause.

Among the nine female patients one reported a certain sudden wrenching of the back, one a single and one a repeated fall on the hip. In two cases the affection was due to childbirth, and in four cases with a slow onset the cause was unknown.

3. The deviation of the back was marked or extreme in twenty male patients; in nine of those with a definite traumatic cause and in eleven of those with a frequent occupational strain. Three of the female patients showed a marked, none an extreme deviation of the back. Of those three, one reported a fall on her hip and one childbirth as cause, while in one case the cause was unknown.

4. Among the male patients the general health and appearance was good in sixteen cases, fair in ten cases and poor in five cases. Two patients were fat men with a marked protuberance of the abdomen. Among the female patients six presented a poor and three a fair general health and appearance, one patient was a stout woman.

5. The direction of the deviation was toward the affected side in only four cases, all being men. Two had reported a definite and two an indefinite traumatic cause.

6. Among the male patients seventeen presented a very flat or obliterated lumbar lordosis and in five cases the lordosis was even reversed. Only three cases showed an increase of the lumbar lordosis, while in six cases no note has been made. Among the female patients two presented a diminished, two a reversed,

and three an increased lordosis; in two cases no note has been made.

7. Among the male patients with a definite traumatic cause the result of the treatment was satisfactory or good in six cases and not satisfactory in four cases. In two cases a distinct relief was noticed, but was not constant. Among the male patients with an indefinite cause the result of the treatment was very satisfactory in three cases only, a certain improvement was reported in four cases, inconstant improvement in one case. In eight cases the result was unsatisfactory; in six of them the time of treatment has been several months up to one and one-half years. In four cases no notes have been made as to the result, two of them being under observation only one or a few days. Among the female patients four showed a satisfactory result, three some improvement and two, both with a slow onset, no improvement.

With a few exceptions it is noticed that the time between the onset of the disease and the treatment at the hospital has been much shorter in those cases which showed a satisfactory result than in the others.

Conclusions.—1. In our clinic sciatic scoliosis has been found a rather frequent affection.

2. It is most frequent in the age between thirty and forty years. It has never been observed in the age below puberty and is very rare in the age over sixty years.

3. There seems no prevalence as to the side of the affection.

4. Homologous cases are much less frequent than heterologous cases.

5. Men are much more frequently affected than women; especially the extreme type is very rare in women.

6. Traumatism plays an important, perhaps the main rôle in the etiology.

7. A marked lateral deviation is usually connected with a marked flattening or reversing of the lumbar lordosis.

8. The prognosis is much better in cases with a definite traumatic cause than in those with an indefinite slow onset.

CASUISTICS.

In the following a few cases are reported which have been treated by the writer with methods which, though not original, are somewhat different from those ordinarily employed in our clinic:

CASE I.—Engineer college student of twenty-two years. Family history without interest.

The patient has had many major and minor illnesses since childhood. He had vomiting and headache after falling with the head on a curbstone when seven years old. This was followed by chorea, which lasted for a long time. A congenital hernia has been operated when he was sixteen years old. He has had pain in that region off and on since; especially during the last years.

With nine years scarlet fever; with twelve years rheumatic fever; pain, but no joint swelling. He has grown rapidly in the age of thirteen to eighteen and had often pain which was considered to be growing pain.

In spite of all that, he has done much athletic work, as football, hockey, rowing and has walked a great deal in his profession.

In April, 1910, he was feeling more tired than usual; the winter before he had played much hockey and had done much walking. He noticed that he had to straighten out his back after writing for a while. He had some pain in his right iliac crest and lower back, but kept on walking and massaged himself. After getting up from sitting he noticed that he held himself somewhat inclined toward the *right* side. Treatment prescribed by a physician and consisting in aspirin and soaking with hot water gave no relief.

During the summer he did much rowing, camping out of doors, and was often wet through. In the fall, 1910, he entered college and was advised by the football coach to join the team. For two to three weeks he felt better, then the pain became more severe and more extended over the right hip, crest and sacroiliac region.

In spite of that he managed to pass through the football season.

In the winter 1910-11, he consulted an orthopedic surgeon who made the diagnosis sacroiliac strain and strapped the back for a few days. After a short time of rest and baking he at first

felt better, but became much worse, when he had to walk one-quarter of a mile.

After that a manipulation under ether was done which made him very stiff and increased his pain very much. He also had indigestion and constipation during that time and tonsillitis. After the manipulation he was so much worse, that he could not walk more than 100 feet and had to use crutches for nearly three months. Baking or heat in any other form used to make him much worse.

In April, 1911, he consulted a medical authority who gave him a certain relief by general dietetic prescriptions and aspirin.

In the summer, 1911, he went to an osteopath who manipulated his back and legs in the usual way, massaged and stretched his sciatic nerve. Six treatments were followed by a certain improvement, but pain in walking and the deformity persisted.

In September, 1911, he had the tonsils removed and was at a hospital for seventeen days. After that time he was not able to work for several days on account of severe pain. A few weeks later he was sent to the medico-mechanical department of the Massachusetts General Hospital, where the following examination was made:

Tall, well-built, healthy, though somewhat tired looking young man with healthy internal organs.

Seen in standing from front one notices that he holds his body markedly drawn forward and to the *left*; the middle line shows a marked sharp bent in height of the umbilicus. The pelvis looks tilted toward the front and the right side. From back the list toward the left side is also very marked. The spine describes a total left curve, most marked in height of the third lumbar vertebra. The right trochanter is markedly prominent; the left shoulder is somewhat higher than the right one. The whole back is very flat, but shows a slight dorsolumbar lordosis. The patient holds his right knee and hip slightly flexed. Any attempt to straighten them causes much pain along the right sciatic nerve and increases the deviation of the back markedly.

He stands on either leg alone without difficulty. In walking he seems to protect his right hip; he does not allow the leg to swing forward, but brings it forward with the whole right side, somewhat resembling the gait of a patient with hip disease.

The motions of his back are markedly limited. In bending forward the deformity is increased. Bending to the right side is easier than to the left. Bending to the left is not possible so far, as to straighten or overcorrect the total curve.

The deformity is the same in lying. The right leg and but-

tocks are somewhat atrophic. Straight leg raising is markedly limited and any attempt very painful on the right side, it is almost free on the left. Flexion of the right hip is free, abduction and rotation somewhat limited. Full extension of either hip is not quite possible. Hyperextension of the lumbar spine in lying is impossible. In lifting the legs up backward the spine is lifted like a stiff rod.

Tenderness over the right sacroiliac joint, the sciatic notch and above and downward along the sciatic nerve. No paralytic signs, no disturbance of the sensory nerves, reflexes normal.

Both feet are markedly flat and pronated. In trying to supinate his feet in standing which is decidedly difficult the patient has to rotate his whole legs much outward, unless he cannot raise the inner border of the foot. This symptom is more evident on the right side.

The X-ray picture shows a very large right transverse process of the fifth lumbar vertebra. The point of that process is somewhat thickened and darker. There is a distinct shadow between that point and the ilium.

Treatment with a number of Zander apparatus for his back and legs had only a slight if any effect. In January, 1912, he was sent to the orthopedic ward and a plaster jacket was put on after a few days of rest. The jacket and rest again, as before, increased his symptoms. Then in March, 1912, I started a treatment consisting of massage of his back and buttocks and a number of exercises in lying, sitting and in knee-elbow position. After a short time the patient reported a slight relief, which increased gradually. It aided the improvement in that I kept the feet well strapped for several months. I also raised his left heel $1\frac{1}{2}$ inch and had him wear a $1\frac{1}{2}$ inch thick felt pad under his left buttocks to raise his left side in sitting.

Within two months a marked improvement was obtained; the pain had gone for most of the time, the deformity was easier correctable and the stiffness of the back and right hip was diminished. The patient continued the treatment, though with intermissions, for about six months longer. Now he has a perfectly flexible back, his right hip is nearly normal in motion, the straight leg raising of both legs is possible beyond the right angle. The lumbar lordosis is somewhat better

noticeable. The patient walks rather normally. The deformity is not fully corrected, though it is much less evident. There is off and on a slight pain along the right sciatic nerve after a long walk. The patient enjoys life as before, but I have advised him against too vigorous sports and exercises.

In this case which was very instructive, but somewhat puzzling to me, we have had to deal with a seemingly widespread inflammation affecting the right hip-joint, the right sacroiliac joint and parts of the lumbar spine. After listening to Dr. Goldthwait's interesting paper, presented at the meeting of the American Orthopedic Association in Atlantic City in 1912 it seemed to me, that this patient might have had an inflammation of a bursa between the right transverse process of the fifth lumbar vertebra and the right ilium. The X-ray picture is very suggestive in this direction.

The cure of this case has been obtained by several factors and it will hardly be possible to state definitely the prevalence of one over the others. There come into consideration: 1. The excision of the tonsils which however did not show any visible effect before six or seven months; 2. the correction of the faulty attitude of the feet by long spiral strapping with adhesive plaster; 3. the raising of the left side in sitting, standing and walking; 4. massage and 5. exercises.

The first three points do not need any further explanation. Massage has been given on the back and buttocks in the form of deep kneading of the muscles, effleurage, vibration and tapotement.

Exercises were given as follows:

1. *Lying Prone*.—Manipulating backward of the right ilium with the operator's right hand while the left hand presses against the left erector spinæ in height of the third lumbar vertebra, the place of the most marked curve.
2. Hyperextension of the right leg.
3. *Lying Supine*.—Gentle straight raising of the right leg with fixation of the right ilium.
4. Passive and resistive exercises of the right hip in all directions, especially in abduction.

5. *In Knee-elbow Position*.—Resistive exercises of the spine, especially curving upward with the hand of the operator pressing as in No. 1.

6. Hyperextension of the right hip from the same position as in No. 5.

7. *Sitting*.—From a forward bent position the patient has to straighten his spine and to bend it somewhat backward against a resistance given by pressure on the same place as in No. 1.

In the beginning those exercises were given very gently. With progress in the improvement gradually more force was added in the passive as well as in the resistive exercises. After three to four months of regular treatment, three times a week, a considerable amount of resistance was overcome by the patient with much ease and without any pain.

In the following three cases are reported which have been treated by the writer with traction with and without elevation.

CASE II.—The first patient was a forty-year-old slate roofer who had experienced numerous slight accidents. Two years ago he had a sudden pain in his right leg, later in the left and after a period free from pain the right leg again was affected. He soon noticed a marked list to the left side and increasing limp. The pain begins at the posterior part of the thigh and runs down the leg. Since six months he cannot walk but with a limp and with much pain. No pain in the back.

The examination shows a strong, but somewhat tired and run down looking man. Aside from a slight reddening of his throat and rather poorly kept teeth, the general examination is negative.

The patient stands with a marked list to the left side which cannot be corrected. The lower spine is very flat. The spinal column shows a right lumbosacral and left dorsolumbar scoliosis. The forward and backward bending is nearly entirely limited, the lumbar spine is held absolutely stiff. Bending toward the right side is very much restricted and painful. Correction of the right lumbar curve is impossible. Bending toward the left side is normal.

The right iliac crest is more prominent and slightly higher than the left one.

There is no tenderness on pressure over the spine nor along the sciatic nerve; some tenderness over the right posterior iliac spine.

In lying the list is less marked. Hip and knee motions free. Straight leg raising is limited and painful in both legs at about 45 degrees; the pain is referred to the region of the right sacroiliac joint.

The right leg measures one inch longer than the left one and is slightly thinner.

The X-ray picture is considered to be negative aside from the asymmetry.

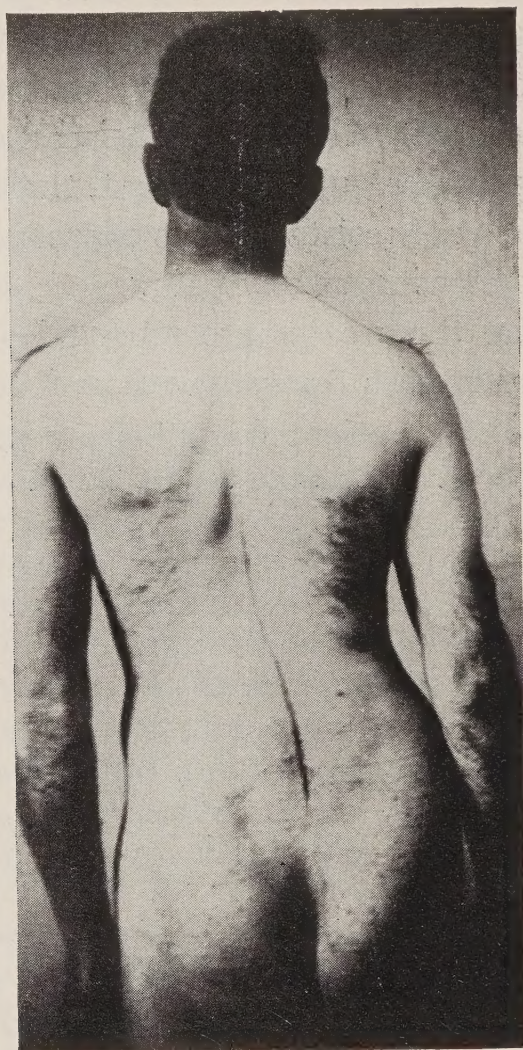


FIG. 1.—Case III. Before treatment; correction impossible.

He was under treatment for several months, plaster strapping, belts and numerous plaster-of-Paris casts being applied in various positions without lasting relief. He also has been manipulated once. Then I put a simple longitudinal traction on his right leg with 10 pounds weight. The relief from pain was instant and lasted for two weeks. Then unfortunately, I applied a plaster cast with a spica; the pain returned and patient left the

clinic. After two months I saw the patient again at the out-patient department; he was in a much better condition than before, though not yet able to attend to his work.

CASE III.—Although this case was not at all conclusive, I became encouraged and soon tried the method on another case which was about the worst in lateral and anteroposterior

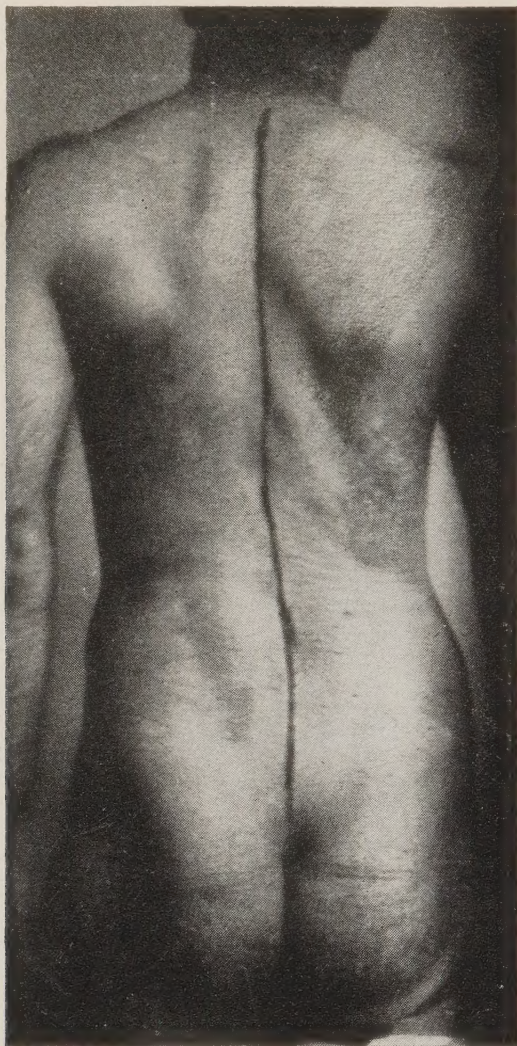


FIG. 2.—Case III. After four weeks of traction and elevation.

deviation I have ever seen. This patient was a motorman on a street car. In October, 1911, he noticed a sudden sharp pain in his right hip, without being conscious of any particular definite cause. The pain gradually extended to the right sacroiliac region and downward toward the external malleolus. It is now more a dull dumb feeling. He has considerable difficulty in walking. He complains of constipation.

After a not very satisfactory treatment with plaster casts at the out-patient department he entered the orthopedic ward

on March 12, 1912. The examination showed a well built strong man, seemingly tired from prolonged suffering. He stands with an extreme list (deviation about 8 cm., see Fig. 1) toward the left side, which cannot be corrected in the least. The spinal column shows a left dorsolumbar and a right lumbosacral lateral curve. The whole spine is very flat, the lumbar

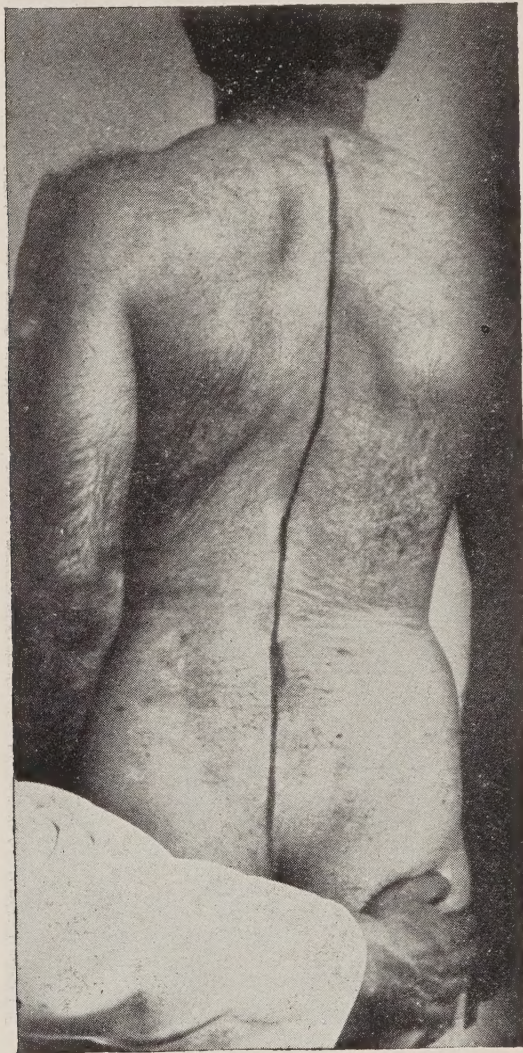


FIG. 3.—Case III. Passive correction easily possible after the treatment.

spine is even slightly backward reversed. The erector spinæ muscles are very rigid and the lumbar and sacral spine very tender on pressure. All back motions are nearly entirely limited. Straight leg raising is limited on the right leg at about 20 to 25 degrees. Any further attempt causes much pain in the sacroiliac and lumbar region. Hyperextension of the hips is limited, all other motions of the hips and knees are free. Weight bearing on the right leg causes pain along the

sciatic nerve, but is perfectly possible. The X-ray picture is negative aside from the asymmetry.

A few days rest in bed afforded some subjective relief, but did not change the objective symptoms. A longitudinal traction was then applied and after two days I began to raise his leg with the traction on.¹ This was accomplished by putting the leg on a board, the lower end of which was supported by the cross-piece of Brackett's suspension frame. After ten days the straight leg could be raised to 70 degrees without any discomfort. During two weeks of traction the straight leg raising became nearly normal, the lateral deviation became much diminished (deviation 2 cm., Fig 2) and could be easily overcorrected (Fig. 3) even in standing position. But the most striking result was in that the anteroposterior curve of the lumbar spine which was markedly kyphotic became now distinctly, though not yet in a normal way lordotic. At the same time the mobility of the spine was much improved. I kept the patient in traction for three weeks more and have had him take certain exercises. After six weeks he left the clinic and was able to do some work. At that time he complained of only slight pain in his lower back and on the outside of the right thigh. I have advised him to take up a different occupation, at least temporarily, because of the danger of recurrence, if he should return to his former occupation as a motorman.

CASE IV.—The same method has been tried in the case of a young man who came to the clinic with symptoms suggestive of a sacroiliac displacement. He was manipulated under ether and kept in bed for five weeks which gave him some subjective relief, but had not much influence on his posture. He was markedly listed to the right side, the straight leg raising was limited to about 45 degrees; the lumbar lordosis was somewhat reversed. Since he showed no progress, longitudinal traction was applied and the leg was gradually raised to about 60 degrees. Under that treatment the patient became subjectively and objectively improved; though the effect was not as striking as in Case No. III.

The methods of treatment described in the last three cases have been employed from an experimental point of view rather than from an indication according to any special theory. Looking for an explanation of the results obtained in that way it may be well to compare the effect of the traction in such

¹ The same method has been used by C. Schmidt with good result. (*Monatschrift fuer Unfall heilkunde*, 1906, p. 175.)

cases with that in cases of hip disease, where we relieve pressure due to muscular contraction. In cases III and IV elevation of the straight leg was added to the traction. The elevation causes a tilt of the pelvis backward. Such a tilt occurs anyway in most cases of sciatic scoliosis and may be considered as an effort of nature to protect the affected parts in the rear of the sacroiliac and lumbosacral junctions. With the elevation this tilt would be still more increased, and with the simultaneous traction the muscles would be relieved from their constant spastic contraction due to the irritation from the articular or periarticular lesions.

It is, of course, necessary to provide sufficient time for the healing process; the traction and the elevation cannot do more than furnish conditions under which the inflammation may subside.

REFERENCES.

Albee: A Study of the Anatomy and the Clinical Importance of the Sacroiliac Joint. *J. A. M. A.*, 1910.

Albert: Eine eigentuemliche Art der Totalskoliose. *Wien. med. Presse*, 1886.

Andrews and Hoke: Sacroiliac Disease. *Charlotte Med. Journ.*, 1908, p. 309.

Babinski: Sur une deformation particulière du tronc causée par la sciatique. *Arch. de Neurologie*, 1888, p. 1.

Baer, W. S.: Operations on the Spinal Column. *Annals of Surgery*, 1907, Vol. XLVI., p. 694.

Baehr: Zur Entstehung der Scoliosis ischiadica. *Centralbl. f. Chir.*, 1896, No. 11.

Idem: Kritische Bemerkungen zur Scoliosis ischiadica. *Arch. f. Klin. Chir.*, 1898, Vol. LVI.

Bailey: Diseases of the Nervous System resulting from Accident and Injury. N. Y., 1906.

Barchinger: Sciatica. *Med. Record*, 1908, p. 683.

Berbez: Deux cas de sciatique déformante. *France médicale*, 1887.

Binswanger: Ueber hysterische Skoliose. *Müench. med. Woch.*, 1902, p. 211.

v. Bonsdorff: Ett fall of Ischias scoliotica. Rev. by Fopp.

Bradford and Lovett: *Orthopedic Surgery*, 3rd ed., 1905.

Bregmann: Ueber die Entstehung der Skoliose bei Ischias. *Wien. med. Woch.*, 1895, No. 27.

Brissaud: Les Scolioses dans les neuralgies sciatiques. *Arch. de Neurol.*, 1890, p. 1.

Bruhlet Souppault: Sur les déviations de la colonne vertébrale dans la sciatique. *Med. moderne*, 1892. Rev. by Fopp.

Buzzard, Th.: Clinical Lectures on Diseases of the Nervous System. Phil., 1882.

Cappuccio: La scoliose sciatique. *Gaz. hebd. de méd.*, 1902.

Dana, CH. L.: Text-book of Nervous Diseases. N. Y., 1892.

Delbet: *Presse médicale*, 1894, p. 253. Rev. by Denucé.

Delens: *Thèse de Paris*. Rev. by Denucé.

Denucé: La scoliose dite sciatique. *Revue d'Orthopédie*, 1899, Vol. X., p. 345.

Dercunn, F. X.: Text-book on Nervous Diseases. Phila., 1895.

Dunlop, J.: Relaxation of the Sacroiliac Synchondrosis. *N. Y. Med. Journ.*, 1906, Vol. LXXXIV., p. 1131.

Idem: *Am. Journ. of Orth. Surg.*, 1907, Vol. V., p. 101.

Ehret: *Beitrag zur Lehre der Skoliose nach Ischias*. *Mitteil. a. d. Grenzgebieten der Med. und Chir.* 1899, Vol. IV, p. 660.

Idem: Weitere Beiträge, etc. Same Journ., 1904, Vol. XIII, p. 53.

Erben: Ischias scoliotica. *Beitrag zur klin. Med. u. Chir.*, 1896-99.

Erichson J.: Sacroiliac Disease. *Lancet*, 1859, Vol. L, p. 25.

Feiss H. O.: Report of a Case of Partial Dislocation of the Fifth Lumbar Vertebra upon the Sacrum. *Am. Journ. of Med. Sc.*, July, 1906, p. 63.

Fischer-Schoenwald: Ueber Ischias scoliotica. *Wien. med. Woch.*, 1893, p. 689.

Fopp: Ein seltener Fall von Skoliosis neuromuscularis ischiadica. *Zeitschr. f. Orth. Chir.*, 1899, Vol. VI., p. 435.

Freiberg: Sciatic Pain as an Orthopedic Symptom. *Ohio Med. Journ.*, 1909, p. 17.

Goldthwait and Osgood: A Consideration of the Pelvic Articulations from an Anatomical, Pathological and Clinical Standpoint. *Boston Med. and Surg. Journ.*, 1905, Nos. 21 and 22.

Goldthwait: The Pelvic Articulations. *Journ. Am. Med. Ass.*, 1907, Vol. XCIX, p. 768.

Goldthwait, Painter, Osgood: Diseases of the Bones and Joints. Boston, 1909.

Goldthwait: The Lumbosacral Articulation. An explanation of many cases of "lumbago," "sciatica" and paraplegia. *Boston Med. and Surg. Journ.*, March 9, 1911, p. 365.

Gowers: Diseases of the Nervous System. 3rd ed., 1903.

Gray, L. C.: A Treatise on Nervous and Mental Diseases. Phil., 1895.

Guse and Lesser: Ischias scoliotica. *Wien. med. Presse*, 1894.

Gussenbauer: Rapport de la clinique chirurgicale de Liège, 1878.

Idem: Ischias scoliotica. *Prager med. Wochenschr.*, 1890.

Hatch, E. S.: Sacroiliac Disease. *N. Orl. Med. and Surg. Journal*, 1906-07, p. 726.

Hattute: *Thèse de Paris*, 1852. Rev. by Stein.

Heath, CH.: Sacroiliac Disease. *Brit. Med. Journ.*, 1876 Voll. II, p. 781.

Hoffa: Die neurogenen Skoliosen. *Zeitschr. f. Orthop. Chir.*, 1903 Vol. II, p. 4.

Idem. Lehrbuch der orthopædischen Chirurgie. 5th ed., Stuttgart, 1905.

v. Hovorka: Skoliosis lumbagica. *Blaetter fuer klinische Hydrotherapie, etc.*, 1907. No. 6. Rev. by Stein.

Krecke: Skoliosis ischiadica. *Muench. med. Wochenschr.*, 1900, p. 188.

Kypke-Burchardi: Ueber Ischias und die dabei zuweilen auftretende Skoliose. Dissertation, Erlangen, 1892.

Lamy: Deux cas de sciatique spasmodique. *Progres médic.*, 1891, No. 2.

Lloyd, J. H.: Diseases of the Sacral Plexus. *Twentieth Century Practice of Medicine*, Vol. II, p. 303.

Lorenz: Rueckgratsverkrueemmungen. *Eulenburg's Realencyclopædie*, 1899, Vol. XXI.

Idem: Ueber ischiadische Skoliose in Theorie und Praxis. *Deutsche med. Woch.*, 1905, p. 1539.

Mann: Ueber das Vorkommen motorischer Stoerungen bei der Ischias mit Einschluss der ischiadischen Wirbelsæulen-Verkrueemmung. *Deutsches Archiv fuer klin. Med.*, 1893, Vol. LI, p. 684.

Massalongo: Il segno. Rev. by Fopp.

Mazurke: Vier Faelle von Ischias scoliotica. *Dissertation Koenigsberg*, 1891. Rev. by Fopp and Hoffa.

Meisenbach, R. O.: Sacroiliac Relaxation with Analysis of Eighty-four Cases. *Surgery, Gynecology and Obstetrics*, 1911, Vol. XII, p. 411.

Nikoladoni: Ueber eine Art des Zusammenhanges zwischen Ischias und Skoliose. *Wien med. Presse*, 1886, No. 26, 27.

Nutter, J. A.: Sacroiliac Strain. *Montreal Med. Journ.*, Dec., 1909, and April, 1910.

Oberndoerffer. Ischias scoliotica. *Centralbl. f. die Grenzgebiete der Med. und Chir.*, 1906, Vol. IX, p. 686.

Ogilvy: Chronic Backache, Etiology, Treatment. *N. Y. Med. Journ.*, 1911, Vol. XCIII, p. 773.

Osler: *Modern Medicine*, Vol. VII, p. 496.

Painter, C. F.: Arthrodesis of the Sacroiliac Sychondrosis. *Boston Med. and Surg. Journ.*, Aug., 1908, p. 205.

Pal: Scoliosis ischiadica bei Platt- und Knickfussleidenden. *Wien. med. Woch.*, 1910, p. 1450.

Peckham: Sciatica and allied Affections. Tr. Rhode Island Med. Soc., 1908, Vol. VII, p. 646.

Plate: Ischias scoliotica. *Muench. med. Woch.*, 1911, p. 56.

Remak: Alternierende Skoliose bei Ischias. *Deutsche med. Woch.*, 1891, p. 257.

Riedinger: Ueber Rotations-luxation der Lendenwirbelsäule. *Archiv für Orthopædie, etc.*, Vol. II.

Rouget: Sciatique ancienne. *Bull. et Mém. Soc. méd. des hôp. de Paris*, 1903, Vol. XX, p. 1048.

Sachs: Beitrag zur Frage der Ischias scoliotica. *Arch. für klin. Chir.*, 1893, Vol. LXVI, p. 684.

Salomonson: Ischias scoliotica. Rev. by Fopp.

Sayre: Lectures on Orthopedic Surgery, N. Y., 1876.

Schuedel: Ischias scoliotica. *Arch für klin. Chir.*, 1889, Vol. XXXVIII.

Scott, E. L.: Sacroiliac Strain. *Alabama Med. Journ.*, 1907-08, p. 507.

Staffel: Zur Frage der Ischias scoliotica. *Zeitschr. für Orth. Chir.*, 1910, Vol. XXVI, p. 543.

Starr, M. A.: Nervous Diseases. 2nd ed.

Stein: Ueber die Beziehungen zwischen Ischias, Lumbago und Skoliose. *Zeitschr. f. Orth. Chir.*, 1910, Vol. XXV.

Taylor, H. L.: Orthopedic Surgery for Practitioners, 1909.

Thoele: Ischias und homologe Skoliose. *Deutsche med. Woch.*, 1907, p. 869.

Thomayer: Zur Physiologie der Rumpfbewegungen. *Wien. klin. Woch.*, 1898.

Idem. Scoliotische Ischias. *Rev. Neurol. Centralbl.*, 1905, p. 958.

Turner, W. A., and Stewart, T. G.: Text-book of Nervous Diseases. Phil., 1910.

Vulpius: Skoliosis neuropathica. *Deutsche med. Woch.*, 1895, p. 583.

Valentini: Ein Fall von Ischias scoliotica. *Deutsche med. Woch.*, 1851. Rev. by Ehret.

Whitman: Treatise on Orthopedic Surgery. 4th ed., 1910.

Wilks, S.: Lectures on Disease of the Nervous System. Phil., 1883.

Young: Sacroiliac Displacement. *Ann. of Surg.*, 1910, p. 419.

Zesas: Ueber die Tuberculose des Iliosacral Gelenkes. *Zeitschr. für Orth. Chir.*, 1906, Vol. XV, p. 330.

Fitch, R. R.: Mechanical Lesions of the Sacroiliac Joints. *Am. Journ. Orth. Surg.*, May, 1909, p. 693.

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The American Journal of Orthopedic Surgery

THE OFFICIAL PUBLICATION OF THE
AMERICAN ORTHOPEDIC ASSOCIATION

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1012 WALNUT STREET

 PHILADELPHIA